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An Inaugural Essay
On the
Process employed by nature
In Suppressing Hemorrhage,
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By
James T. Leckie
of
South Carolina.

The accidents to which mankind is liable are so diversified and complicated that to a reflecting mind it must be a matter of surprise that there are not a vastly greater number of victims to them than we actually observe: this surprise is increased by the conviction that they are often rendered doubly dangerous by the blunders of the ignorant and officious: even those from whome more should be expected are frequently found deficient, and their ill timed interference with nature where she is amply sufficient to repair ~~to repair~~ the injury sustained, not unfrequently commits the unfortunate, to unnecessary torture, but oftentimes to an untimely grave. On the other hand when assistance is plainly demanded, either ignorance of the proper means to be

adopted, or a want of self-command which should at all times be the hand maid of every surgeon, under him a mere machine, vacillating at the suggestions of every one around him, utterly regardless of what his reason in cooler moments would have dictated; and only called to a sense of his own deficiency when he sees the hand of death upon his patient. Independent of these circumstances hemorrhage when profuse may terminate life, when in the common course of things we can have no control over it; this arises from the absolute impossibility of obtaining assistance in time, and if obtained the bleeding may proceed from vessels situated in some of the dark cavities of the body, or in places, which none but a madman would think of exploring.

It is the dread of hemorrhage

which continually stands in the way of the young surgeon, mars all his operations, and not unfrequently prevents him from taking measures for the benefit and even security of his patient; which his judgement suggests, "were this one danger removed, he would go forward in his profession almost without fear". "Un sentiment naturel attache à l'idée de perdre son sang: un terreur machinale, dont l'enfant qui commence à parler et l'homme le plus décidé, sont egalement susceptibles. On ne peut point dire que cette peur soit chimérique. Si l'on comptoit ceux qui perdent la vie dans une bataille ou veroît, que les trois quarts ont péri par quelque hemorrhagie; et dans les grandes operations de chirurgie cet est presque toujour le plus formidable"

It is surprising that a subject so

interesting in every point of view, should have excited so little attention, until a period which is almost within the recollection of the present generation: the ancients ignorant alike of the process which nature institutes, as of the means by which she is rationally to be assisted, must have fallen victims to the unrelenting attacks of such diseases as in modern times are only to be met with a timely use of the knife; when operations were resorted to, which were seldom, their horrors were augmented by the parade of burning irons, and cauterics, that modern surgery has almost banished from the list of her remedial agents.

With all the resources of the surgeon of the present day, hemorrhage the consequence of accidental wounds is one of the most appalling cases his feelings a man wit=

against the married state, and humanity, or the interest of wife which is kept between the unfortunate and the crime, has to contend with; altho' death by bleeding is not the most painful, yet the imagination would find it difficult to remain on more than; with the loss of blood the patient feels that his spirits, and strength are on the wind, and the horror of death increases as he draws towards its confines: this reminds one also of duels, the anxious spectators of his, also look at it as the act of other people, and the consequences may cannot but and the impossibility of his situation; to do all that we can for those interested in it, is not to be a moral obligation, than our social state is, a consideration, and that man to be an object in

with the death of an individual through cause, single, or neither, has a further instinct upon him, which subsequent operations will hardly be able to remove.

All wounds do not afford the same facility to the flow of blood, which circumstance has been one cause of variation in their treatment, and authors generally have with dual propriety made a division of them, giving to each its specific character. The following arrangement appears sufficiently correct for our purposes.

Contused wounds
Lacerated wounds
Incised wounds
Punctured wounds.

Contused and lacerated wounds differ from all others in as much as they are

not liable to profuse bleeding in the beginning; thus indisposition to hemorrhage arises from the vessels which have been in action on the weaker side, and on the nerves being until then as actions are maintained, yet nervous influences have been destroyed, the arteries are not able to propel the blood along the inured vessels, if these constricted, and it is not until the cicatrix has been formed by the process of absorption, and inflammation, that hemorrhage takes place; this is what has been termed "secondary hemorrhage" and is decidedly the most difficult kind to arrest, because it is with reluctance that a patient will submit to the torture of having a wound torn up, and when opened the retraction of the vessels is generally so great that it

+ "when they do not open the wide flow gate
and let them out - forth of its circumference?"

it would after a great deal of trouble, extremely dangerous to the patient, that the case be found, and treated; whenever we meet a wound of this kind it is our duty to guard against this circumstance by making a thorough examination of the extent of the injury, and afterwards our adents be sound healed.

Whenever a considerable artery has been wounded by a pointed instrument, the danger to be apprehended will be in proportion to the injury that the vessel has sustained, for it has been shown that such wounds heal with as much facility as those inflicted on any other tissue, but more of this hereafter.

Incised wounds being attended with none of those circumstances which so essentially retard the process of the

from other wounds, hemorrhage is [illegible]
very profuse, and if the two ends [illegible]
be kept attentively together: but [illegible]
with a very [illegible] [illegible] [illegible] [illegible]
be divided without [illegible] [illegible] [illegible]
in [illegible], and their patency [illegible] [illegible] no
doubt a coagulation of the particles of
of the wound, giving at the same time
[illegible] [illegible] for the stoppage of
blood, and the fibrinous [illegible] to the
circulation of the blood, and it is [illegible]
time, and [illegible] to [illegible], he was
[illegible] with [illegible] difficulties,
unless the wound extend into [illegible]
or [illegible], or [illegible] [illegible] [illegible] [illegible]
effusion of his opinion. [illegible] [illegible]
these two [illegible] [illegible] [illegible] [illegible] [illegible]
the [illegible] [illegible] [illegible] [illegible] or [illegible]
Hemorrhage, and this may be [illegible]

ideas for debate, that problems of
chemical affinity on the subject
have been derived from Thomson's elaborate
work "on human air".

Among the discrepancies of opinion between
authors with regard to the proportions in which
the various constituents of human tissue
it is difficult without actual experiment
and examination to form a decided
opinion; each one relies upon the instal-
-libility of his own observations, and experi-
ments, performed in regards elucidation of
theoretical opinions, and affects therewith
-Mep with the dogmatical zeal of
sectarians, branding those of their opponents
as entirely wrong, or at quite but few dis-
-views of the subject. We represent in
themselves in the lower ranks of our a

objections might be raised; the deductions arising from them [illegible] called in question, [illegible] tion [illegible] their validity; this is the ordeal which it is destined to undergo [illegible] them, and in [illegible] [illegible].

The attention of the profession was first called to this interesting subject by the celebrated Petit in 1731, and perhaps it was the impulse that it received from the magic of this great man's name that drew around it so many votaries; M. Petit's ideas are certainly correct as far as they go, but it will be shown hereafter that he has taken a very limited view of the subject; the conceived that hemorrhage from a divided artery is stopped by the formation of a coagulum of blood which is situated, hence

within, and partly without the vessel. This clot afterwards adheres to the inside of the artery, to its critica, and to the surrounding parts; he adds that when hemorrhage is stopped by a ligature a coagulum is formed above the ligature, which only differs in shape from the one which takes place when no ligature is employed; these ideas led him to authorise that the ligature did nothing more than afford support, which could be equally well afforded by injecting into the vessel substances that be adapted to induce the coagulation — it would be difficult to decide whether Dupuytren, in the whole was trustworthy or injurious, but it is that branch, for the just eye testify, was not the least obnoxious, which the introduction of the ligature afforded an striking illustration of the power of Providence.

ohnious, so to occupy the mind and
fix it the acquisition knowledge.
Horne followed Pitt, and adopted
his doctrines as the tested which he
tested his own, but added another im-
portant fact, which Mitchell has
"a little tried upon the question
of cycles"; he concluded that a compression
or flattening of the earth lines in the
axis which minor it's axis, and
a shortening, and consequent thickening of
the longitudinals, at the equator
of latitudes, but seen in the
process: He also thought that the orbit
of an orbit might be altered into
the form, or corrugation, upon certain
terms as that of a tide wave
made.

Albert Hume had assigned a cause

for the appearances which he observed, that anatomists denied our pronouncing, with assistance of his table of measures fixed but not with the satisfactory demonstrated, still he endeavoured to the situation and contractile structure made out by Mr Ford.

M. Prudeau treats the operations of Pelet, as what instituted to obtain the remains, and in direct opposition to the appearances observed on examinations his notions as that hemorrhage is restrained by the swelling of the cellular tissue surrounding the uterus, "Il me crois fondé à attribuer ce résultat heureux de l'autère jusqu'à l'obliteration, à la tumétaction et au développement de la tissu cellulaire" [illegible] pp. 321.

The English surgeons have, in the,

Dickens, and Richmond, also agree in denying the utility of the coagulum of blood. Dr. Gibb. While in his "Cases in Surgery" declares that "it is absolutely useless, and should always be removed before the application of strapping, or any surgical dressing". These all agree in attributing the distinguished Hemorrhage to the contraction of the extremities of the arteries.—

The notice which had been taken of the different theories induced me to think of Professor Bell, who had been most lately in his absence the Continental Surgeon, who differed from him in opinion, without according merit where it existed, yet it appears to me that his ideas are the same as those of Dr Porterfield modified: in illustration of this opinion, I quote from his first volume of the

Principles of Surgery, page 1st. "Hæmorrhage also is of two kinds according as it arises from the interruption of the arteries, or the constriction of the veins, or the vessels of both, in the same limb which divides the whole limb into "veins", in the 2d case it is evident that obstructing ligatures of both provenance, neither can it think that the illustrations of Professor Miller for the other or intermediate) lines, tying it more. The idea which he wished to inculcate is clearly that the ligature of the arterial system is sufficient to stop the flow of blood in the small arteries, which is found to be wholely inadequate to do in those of a larger size, unless assisted by the ligatures. Now in what it will consists

the difference between the theory and that of Dutrochet, "regarding the division of the cellular" It seems to be nothing more or less than this intection of the "cellular division" on which Mr Schleiden has claimed to be distinctly that an objection may be made to the remarks in a recent "Confession" may mean a sinking from an old card than that of Good, as this Mr Schleiden had expressed to "Lumpsdon", and it is not to be disputed that we should have used two words to express the same idea, such landslide is not common among men writers but we have of distinction it seems necessary to carry their meaning, and I could have been understandable in this instance, considering the wide ground

[illegible] placed,
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible], and whose errors were so
many beacon-lights in a devious track.
Pelit has fallen under his particular
displeasure, and that too according to
his own confession for "perhaps" "only
wrong thing that he ever did". "Mr Gover
and Mr B. Bell the alter ipse of Mr Gover",
he continues, "have hereserited Prin Pelit
with such praise as they could bestow;
Pelit's spirit has fully expiated this offence;
nothing can be more dangerous
to a man's posthumous fame than to have
those things commended, and recorded
which should in mercy be forgotten (P. 172)
Again "this miserable theory, like a sickly
child, became every day dearer to Pelit,

and he never thought he could do enough to feed it and strengthen it".

Most of the theories heretofore mentioned, ascribe the diffusion of hemorrhage to one particular cause, but the experiments of Mr. Jones incontestably prove that this process is the effect of a combination of causes each one performing its part in the great work — the blood, the action of the arteries depending on their physiological structure, their sheaths, the cellular membrane surrounding them, and in one word all the parts concerned in hemorrhage contribute either directly or indirectly. It is to this exclusive, and indefatigable industry, that the medical world are indebted for correct notions on this very important subject; his opinions are based on the result of a vast number of experiments, conducted under circumstan-

-ces the most accurate, or the elucidation of truth. From this it appears that a violent gush of blood, the laceration of the artery within its sheath, together with a slight contraction of its coats are the immediate and almost simultaneous effects of its division; this contraction is in degree proportionate by the stream of blood, which distends, into the extra distance between the vessel and its sheath, and either flows external, or infuses the cellular membrane in the neighbourhood of the sheath, according to the extent of the wound. But the laceration of the artery within its sheath, and consequent stretching, and laceration of the cellular substance between them, a tedious process which extravasates the blood in its, and outwards, until a coagulum is completed, which blocks up the mouth of the vessel

that a vital effusion had passed the vessel's coagulum, and is the prior lesion that is equal to the flow of blood; that coagulation is moreover considerably aided in manner similar to the left hand jacket that the blood had a tendency to coagulate in proportion to the quantity lost, and the diminution of the force of circulation. The loss of blood being arrested in the vessel, a small slender coagulum is formed within it dominated the internal. The volumes of the arteries inflamed, and the upper the vessel extension, pour out particles of lymph, which is effused between the two aquea, adhering to them, thus extensive becoming organized effects the permanent suppression of hæmorrhage. The gradual obliteration of the artery then takes place by one

effusion of lymph between its coats, and into the cavity of its tissue, these became thickened and so completely blended, and confounded with each other that it cannot be distinguished.

In the mean time the external coagulum is necessarily in consequence of the immediate flow of blood becomes absorbed, the coagulating lymph deposited at its mouth and between its tunics is gradually removed, & the artery assumes a membranous appearance as high as the first anastomosing branch. These different changes can only be observed for a short period after the receipt of the injury, for then nature sets about a more complete separation, if the parts be examined at a distant period, it will be found that the ligamentous substance has been reduced to a mere filament which can

can only be distinguished from the surrounding collateral tissue by its firmness and vascularity.

Before these observations were published the branches both above, and below the wound were so enlarged, and have continued ever since, that they carry on the circulation as perfectly, and vigorously as if the artery were entire.

The internal coagulum plays a secondary part in arresting hemorrhage, that I have as yet never noticed the existence of, but it does not always exist, for if the artery be divided very near the point where it has given off a branch, it may be detected, and it appears that the length to be dependent entirely upon this circumstance: in deeper incised wounds the internal coagulum is of little consequence, but when the parts from the

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lacerated, and the extremities of the vessels have ruptured within, then the congestion must extend beyond the first collateral branch in consequence of the obstruction of blood from the more distant parts of the vessel; and may do a important purpose.

A similar state of things takes place in the inferior parts of the abdomen and pelvis, when the cause of the obstruction, the uterine congestion has ceased and the contraction of the vessel and of the uterus.

A complete division of an artery does not happen in every instance, it may be wounded or the ball divided by a splinter of bone and sometimes lapped in an incised wound, or it may be bruised, or hardly pinched by the point of a sharp contractile instrument, as in those

species of wounds called punctured, and the difficulty which nature will encounter in the suppuration of the hemorrhage from such wounds will be in proportion to their extent and direction. Wounds inflicted must consist of the longitudinal, transverse, or oblique wounds will differ in the edge of the aperture, which they leave in an injury; this depends on the properties of elasticity and contractility inherent in the coats: a wound in the direction of the course of the artery will occasion the least gaping, that obliquely across it will gape in proportion to its edge, and a transverse wound from a sharp instrument produces a circular gaping.

When an artery has been wounded by a penetrating instrument there is immediately an effusion of blood between

its accompanying sheath and its external tunic, this partially distends the sheath, and the orifice in it, and that in the artery, which before was immediately opposite to it, may often have their relative situations changed; a the occasion of blood being interposed, which blocks up the passage in the artery and prevents further hemorrhage. this condition like the external one is divided, or torn, and stops the flow in the first instance, and gives nature an opportunity of constituting a more effectual barrier, by the effusion of coagulating lymph from the lips of the wound; the lymph should be now organized, and form a kind of union between the divided parts, which are so completely opposed, not by tow fibres, or so adhesion to the adjacent parts; to

illustrate the position of transposition of the aorta. "The trachea along of a large dog was found on itself a tumor as high as not could be an unusual distribution, the arteries and veins and the pericardium, and ventricles detached from the aorta, on dissecting the axillary and brachial a lines of ossification, and the stripes were seen in the pericardium and it was impossible in examination to determine which had been punctured, the cellular membrane however around the wounded artery was somewhat thickened and adhered to the artery, but could be easily separated from it."

When however the wound in the artery is considerable although union may take place, the quantity of coagulation must

is so great that the ends of the sloughs become more or less loosened, especially if Suppuration begins to set in, when the wound must be forced to discharge the effect). Dr Dunsdon of Bath is he stitched the sloughs together with a common crooked needle & waxed with a tapering twisted ligature: the two ends were cut off at a small distance from the wound, and the wound allowed to take its own course. Twenty five days after the separation of the arteries were secured: the ligatures were gently withdrawn on the second about an inch above and below the seton: no trace of a wound was discernable on one side of the abdomen on the other a slight depression was in which a small part of the tuberculated ligature remained which he snipped

the ends of the vessel were tied, or
had not quite ended, a small portion
of blood would have escaped, which
would have been passed. There
is no doubt, however, that
the vessel in which was gradually contrac
ted in the natural world is a short
time have been quite obliterated, and
we are quite sure that no blood circulated
through it at the time the animal
was killed".

When the wound in the artery is much
larger than in the case above supposed, quite
a different state of things takes place.
Owing to the natural contractility of the
arterial coats the divided parts are
kept continually on the stretch, and
in the space of a short time the artery
is torn completely through, or else the

irritation which results from this cause induces ulceration by which the separation is brought about

The similarity of disease between the animals, which have been the subjects of the above experiments, and that of man, would lead us to think that similar causes would induce similar effects in each, and such I believe would be the case, were the circumstances which follow the reduction of an injury, in both cases alike: Mr Jones had occasion to notice that whenever an animal, which was the subject of an experiment had suffered severely from hemorrhage that it manifested a great disinclination to motion, lying whole days sometimes in the same position without touching the food that was placed before him, but in man the case is quite different, for it is

a difficult matter to enforce absolute rest and abstinence, it is not an uncommon thing however to see wounds do well, where our anatomical knowledge must assure us, that important blood vessels have been wounded, it is also a rare circumstance that we have an opportunity to examine the state of an artery that has been injured, and even if we had what are we to expect since analogy teaches us that the injury cannot be detected. Let it not be understood however that I am an advocate for giving nature in every instance, a fair chance to accomplish the suppression of hemorrhage in these cases. there may be circumstances in the economy of man which in a great measure prevent those salutary operations we see in the lower order of animals, and where the life of an individual is at hazard, we are erring on

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the safe side to make use of those measures which art has pointed out as a certain means of remedy — here we have something that the common experience of mankind has pronounced effectual, the other to say the least of it is doubtful, and this I hold to be a safe rule in practice "quod non apparentibus, et non existentibus eadem est ratio".